

CONTENTS

	PAGE
LIST OF ILLUSTRATIONS	vii
LIST OF TABLES	ix
PREFACE	xi
1. WATER AS AN INDUSTRIAL COOLING AGENT	1
(1) Choice of a source of cooling water	1
(2) Choice of cooling temperatures	3
2. METHODS OF COOLING WATER	5
(1) Cooling ponds, spray ponds and spray towers	6
(2) Atmospheric open-type towers	7
(3) Chimney-type natural-draught towers	8
(4) Mechanical-draught towers	9
(5) Mechanical features of water-cooling towers	10
3. DESIGN OF MECHANICAL-DRAUGHT TOWERS	12
(1) Total-heat theory	12
(2) Driving-force diagram	14
(3) Mean driving force	16
(4) Application to design	17
(5) Practical aspects of design	20
Example 1. Design of a mechanical-draught tower	23
4. THE GRID-PACKED INDUCED-DRAUGHT TOWER	26
(1) Characteristics of the grid packing	27
(2) Cost data	29
(3) Economic factors	30
(4) Design methods	31
(5) Practical features	35
Example 2. Design of grid-packed induced-draught tower	36
Example 3. Performance of grid-packed induced-draught tower (wet-bulb temperature not 62.8° F.)	37
Example 4. Design of grid-packed induced-draught tower (wet-bulb temperature not 62.8° F.)	38

CONTENTS

5.	TESTING OF MECHANICAL-DRAUGHT TOWERS	40
	(1) Efficiency of water-cooling towers	40
	(2) Volume transfer coefficient	41
	(3) Departure from specification	43
	Example 5. Calculation of departure from specification	46
6.	GAS-COOLING TOWERS	50
	(1) Design methods	50
	(2) Properties of packings	54
	(3) Economic factors	54
	(4) Mechanical features	56
	(5) Test results on plant towers	59
	Example 6. Design of gas-cooling tower	61
7.	THE TRANSFER-UNIT METHOD	66
	(1) Outline of theory	66
	(2) Application to design	67
	(3) Economic factors	68
	Example 7. Design of gas-cooling tower (transfer-unit method)	70
	Example 8. Design of grid-packed water-cooling tower (transfer-unit method)	70
	Example 9. Design of mechanical-draught tower (transfer- unit method)	71
APPENDIX A. DERIVATION OF TOTAL-HEAT EQUATION ..		73
APPENDIX B. WET-BULB TEMPERATURES AND METEOROLOGICAL DATA		77
APPENDIX C. PHYSICAL DATA		81
APPENDIX D. ECONOMIC COMPARISON OF TWO TYPES OF TOWER		84
APPENDIX E. ESTIMATION OF COST OF COOLING WATER ..		86
APPENDIX F. ECONOMIC FACTORS		88
LIST OF SYMBOLS		94
REFERENCES		98
GLOSSARY		99
INDEX		102